

A REVISION OF THE PSIDIUM GRANDIFOLIUM COMPLEX (MYRTACEAE)

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ABSTRACT

The *Psidium grandifolium* complex is revised with keys, descriptions, maps, and illustrations and is considered to consist of *P. grandifolium*, *P. missionum*, and *P. australe*, the last with three varieties. The complex is mainly confined to eastern interior South America, ranging from Venezuela to Argentina. Lectotypes for the following taxa are chosen: *Psidium argenteum* O. Berg, *Psidium argenteum* var. *purpureum* O. Berg, *Psidium cinereum* var. *grandifolium* O. Berg, *Psidium cinereum* var. *intermedium* O. Berg, *Psidium grandifolium* var. *intermedium* O. Berg, *Psidium mucronatum* Barb. Rodr. ex Chodat et Hassl., *Psidium sericeum* O. Berg, *Psidium suffruticosum* O. Berg, *Psidium incanescens* var. *rotundifolium* O. Berg. Two new combinations are made: *Psidium australe* var. *argenteum* (O. Berg) Landrum and *Psidium australe* var. *suffruticosum* (O. Berg) Landrum.

RESUMEN

Se hace una revisión del complejo *Psidium grandifolium* con claves, descripciones, mapas, e ilustraciones. El complejo incluye *P. grandifolium*, *P. missionum*, y *P. australe*, la última con tres variedades. El complejo crece principalmente en el interior del este de Sud América, desde Venezuela hasta Argentina. Se seleccionan lectotipos para los siguientes taxa: *Psidium argenteum* O. Berg, *Psidium argenteum* var. *purpureum* O. Berg, *Psidium cinereum* var. *grandifolium* O. Berg, *Psidium cinereum* var. *intermedium* O. Berg, *Psidium grandifolium* var. *intermedium* O. Berg, *Psidium mucronatum* Barb. Rodr. ex Chodat et Hassl., *Psidium sericeum* O. Berg, *Psidium suffruticosum* O. Berg, *Psidium incanescens* var. *rotundifolium* O. Berg. Se hacen las siguientes combinaciones nuevas: *Psidium australe* var. *argenteum* (O. Berg) Landrum y *Psidium australe* var. *suffruticosum* (O. Berg) Landrum.

The *Psidium grandifolium* complex is a group of small, fire resistant shrubs of the grasslands (campos) and shrubby vegetation (cerrado) of central Brazil and northeastern Argentina, Paraguay, eastern Bolivia, Venezuela, and Guyana. It presents some of the most difficult taxonomic problems in the genus due to variation within species, apparent hybridization between species in the complex, and hybridization of *P. grandifolium* and *P. australe* with *P. guineense* Sw. Especially perplexing is the fact that there exist regions in which species limits are well-defined and other areas where they breakdown. The species have in common a shrubby habit, ability to resprout from underground stems after fires; young twigs that are usually square or 4-winged in cross-section; leaf venation that is usually eucamptodromous proximally to brochidodromous distally with a poorly defined marginal vein; a placenta that protrudes little and that is com-

pletely hidden by numerous ovules at anthesis; and seeds that are relatively smooth and rounded. A similar group, the *P. salutare* complex (Landrum 2003), has the same habit and ability to resprout vigorously after fires, and smooth, round seeds, but the twigs are not winged, the venation is entirely brochidodromous and the peltate placenta is clearly visible in dissections with one or two rows of ovules on each side.

Calyx structure is often taxonomically important in *Psidium*, but in the *P. grandifolium* complex it is quite variable and not useful in defining the group. The calyx may be fused and closed except for a terminal pore or it can be quite open in the flower bud. The calyx-lobes may be scarcely developed, or quite evident. Calyx structure is generally helpful at the specific level in the complex.

There is considerable variation among members of the *Psidium grandifolium* complex and two or three distinct morphological entities may grow together or near to one another. For instance I have seen *P. grandifolium*, *P. australe* var. *australe* and *P. missionum* growing together at two localities in southern Paraguay. In the municipality of Mogi-Guaçu of São Paulo quite distinct forms of *P. grandifolium*, *P. australe* var. *australe* and *P. australe* var. *suffruticosum* all grow. Unfortunately intergradation among these typical forms is common, and in some areas distinctions seem to disappear. Thus, drawing species limits is quite difficult. I have chosen to accept three species, but all can be expected to intergrade with at least one other in the complex. *Psidium australe* I divide into three varieties, but others might consider these entities species. Intergradation between *P. australe* and *P. grandifolium* is common and I have found it expedient to accept numerous specimens between these species as "intermediates" without applying one name or the other to them. It is possible that the group that I accept as *P. australe* var. *argenteum* has originated through introgression from *P. grandifolium*.

Hybridization with the more distantly related *Psidium guineense* also seems to be common and further complicates taxonomy. Therefore a key is provided that distinguishes that species from the *P. grandifolium* complex.

1. Anthers elongate, 1–3 mm long, usually 3–6 times as long as wide; placenta laminar, sometimes peltate; tertiary veins often producing a ladder-like pattern; calyx closed or nearly so; hairs of lower leaf surface usually more or less erect, mostly nearly straight, usually reddish brown _____ ***P. guineense***
1. Anthers not elongate, 0.5–1 mm long, about 2 times as long as wide; placenta mound-like, not laminar or peltate; tertiary veins reticulate; calyx closed or open; hairs of lower leaf surface generally appressed and straight to densely tangled, usually gray to white _____ ***P. grandifolium* complex**

When studying the *Psidium grandifolium* complex it is important to consider the following characteristics: 1) type and density of hair covering or its absence; 2) peduncle length; 3) calyx-lobe shape and degree of calyx closure; 4) presence or absence of dichasialia; 5) leaf size and shape; 6) leaf texture. The differences are

outlined in the key below. Not one of the characteristics is entirely reliable, but consideration of them all seems to work well in distinguishing these species in Argentina, Paraguay, and usually in Paraná, São Paulo, and Bahia, Brazil. In Minas Gerais, Goiás and the Distrito Federal, Brazil distinctions are less clear.

Perret (1999) proposed that the numerous names published by Chodat and Hassler (1907) and attributed to Barbosa Rodrigues, some of which appear as synonyms in this paper, should not be accepted because their original descriptions are brief and appear to be a mere list of names with minimal information. I believe that these descriptions, although brief, are in accordance with the International Code of Botanical Nomenclature (Greuter et al. 2000). Fortunately they are usually represented by good type collections and may be identified accurately.

For illustrations I have used portions of scanned herbarium specimens. These images can be viewed in their entirety in color in the Image Library on the ASU Herbarium website <http://lifesciences.asu.edu/herbarium/>. A list of exsiccatae will also be made available at the same website once this paper is published.

Ecology.—The species of *Psidium* vary from forest trees to savanna shrubs and grow in coastal vegetation to mountainous habitats. The great majority of the collections of the *P. grandifolium* complex have been made below 1200 m elevation and in the interior of South America. Species of the complex are shrubs and subshrubs and grow in grasslands or in shrubby vegetation (cerrado) and are resistant to fires or other disturbance (but perhaps not grazing), resprouting from underground or surface level stems, being similar to the *P. salutare* complex in ecology (Landrum 2003). During field studies in Argentina and Paraguay I have noticed that these species persist in the narrow strip of natural vegetation between roads and pastures, but do not do well in the pastures themselves.

The climates in which the *P. grandifolium* complex grows often have distinct dry and wet seasons, with freezing temperatures being rare or non-existent. Commonly associated with them are other genera of Myrtaceae (e.g., *Campomanesia*, *Eugenia*, and *Myrcia*); Poaceae, Fabaceae, and Asteraceae often dominate the vegetation.

Suggestions for future work.—Why do these species seem to merge in some areas and remain distinct in others? In areas where the distinctions continue, some sort of isolating mechanisms must exist. What are the barriers to hybridization and under what circumstances do they break down? What are the pollinators, the phenological patterns, and breeding systems of these species? These are all questions that can best be answered by field studies and perhaps concurrent laboratory work in South America and offer interesting opportunities for biologists. The habitats supporting species of the *P. grandifolium* complex

are unfortunately rapidly being converted to pasture and agriculture. A better understanding of their biology is urgently needed for the long-term conservation of these species.

KEY TO THE SPECIES OF THE *PSIDIUM GRANDIFOLIUM* COMPLEX

1. Calyx of flower bud with lobes about triangular, 2–5 mm long, about as long as wide.
 2. Leaves thinly pubescent to glabrous _____ ***P. missionum***
 2. Leaves densely tomentose below _____ ***P. grandifolium***
(populations of southern Paraguay and Argentina)
 1. Calyx of flower bud nearly closed or the lobes truncate to broadly triangular, about 2 times wider than long.
 3. Flower bud just before anthesis 6–15 mm long, densely lanate, the underlying surface of hypanthium hidden, the calyx usually nearly closed; leaves whitish lanate below, generally at least some widest near the middle _____ ***P. grandifolium***
 3. Flower bud just before anthesis 5–10 mm long, moderately covered with hairs to glabrous, the underlying surface of hypanthium visible through hairs (if present), the calyx open or nearly closed; leaves glabrous to densely short pubescent below, generally widest above the middle _____ ***P. australe***

Psidium australe Cambess., in A. St.-Hil., Fl. Bras. Merid. 2: 283. 1833. *Guajava australis* Kuntze, Revis. Gen. Pl. I. 239. 1891. TYPE: BRAZIL. "Prope vicum vulgo Capella de Sta. Maria ad fines provinciarum Rio Grande de S. Pedro do Sul et Missionum," Saint-Hilaire s.n. (HOLOTYPE: Pl. -F-36406! -ASU photo!).

Shrub or subshrub to ca. 1(–1.5) m high, essentially glabrous (except for inner calyx-lobe surface), subglabrous to densely hairy on young growth, sometimes densely covered with appressed hairs on lower leaf surfaces, arising from a fire resistant underground stem; hairs whitish, appressed, to ca. 0.5 mm long; young twigs square in cross section, with four wings, reddish-brown to gray-green, glabrous to moderately pubescent, glandular, with age the bark becoming gray to light brown, the bark flaking off to reveal smooth reddish-brown to gray bark. **Leaves** obovate, oblanceolate, narrowly elliptic, or elliptic, 3.5–11 cm long, 1.3–6 cm wide, 1.6–5.4 times as long as wide, glabrous to moderately pubescent, sometimes densely pubescent below; apex round, truncate, to acute, less often with a cuspidate tip; base cuneate, acute, acuminate, or rounded; petiole shallowly channeled, 0–4 mm long, 1.2–2 mm wide; midvein impressed to flat above, prominent below, the venation usually eucamptodromous proximally to brochidodromous distally, the lateral veins usually 4–8, a clear marginal vein not present, the tertiary veins obscure or forming an irregular reticulate pattern; blades coriaceous to subcoriaceous, drying light to dark olive green to dark reddish brown, usually darker above than below, lustrous or dull above. **Flower buds** pyriform, 5–10 mm long; peduncles sparsely hairy, 1-flowered or 3-flowered, 0.1–3.7 cm long, 0.8–1.5 mm wide, the arms of the dichasia 2–13 mm long; bracteoles narrowly deltoid-lanceolate, 1–3 mm long, clasping the hypanthium, usually falling before anthesis; calyx glabrous to sparsely pubescent without,

apically pubescent within, connate as a cup-like tube for 2–4 mm, with deltoid lobes along the edge of the tube or merely with a sinuate margin, or nearly (rarely completely) closed, tearing more or less irregularly between the lobes to the staminal ring at anthesis, the lobes before anthesis to ca. 1 mm long, to ca. 3 mm wide; petals obovate to suborbicular, elliptic, oblanceolate, 7–10 mm long, glabrous; hypanthium obconic to subhemispheric, 2.5–4 mm long; disk 5–10 mm across, glabrous to pubescent; stamens 100–300, 6–10 mm long, reflexed in bud so that anthers reach the disk; anthers 0.5–0.8 mm long, with 1 apical gland in the connective; style 5–8 mm long, the stigma somewhat peltate; ovary 3–4-locular, usually with a central hollow area; ovules 20–95 per locule, the placenta hidden by ovules. **Fruit** globose to subpyriform, 1.5–3 cm long; seeds subreniform, 3–5 mm long, rounded, 6–50.

Psidium australe may be divided into three more or less distinct varieties distinguished in the key below.

1. Leaves densely covered with hairs beneath, the underlying leaf surface (except for larger veins) hidden by hairs _____ **P. australe** var. **argenteum**
1. Leaves sparsely covered with hairs to glabrous beneath
 2. Leaves often 3 or more times as long as wide, lustrous above; peduncles usually more than 2 cm long, usually 3-flowered; calyx usually nearly closed in young bud; seeds up to ca. 10. _____ **P. australe** var. **suffruticosum**
 2. Leaves usually less than 3 times as long as wide, usually dull above; peduncles commonly all less than 2 cm long, usually 1-flowered; calyx usually open in young bud; seeds up to ca. 50 _____ **P. australe** var. **australe**

Psidium australe Cambess var. **australe**

Psidium australe Cambess in A. St.-Hil., Fl. Bras. Merid. 2: 283. 1833, as to type. (Figs. 1, 2).

Psidium triphyllum Barb. Rodr., Myrt. Paraguay 12. 1903. TYPE: PARAGUAY "Ipé-hú... Sierra de Maracayu," Hassler 4990 (HOLOTYPE G, -ASU photo!)

Psidium mucronatum Barb. Rodr. ex Chodat & Hassl., Bull. Herb. Boissier 7: 798. 1907. TYPE: PARAGUAY. "Ipé-hú Sierra de Maracayu," Hassler 5082 (HOLOTYPE G [4 sheets], -ASU photos; sheet in G photo 105 [LECTOTYPE, here designated]; ISOLECTOTYPE NY!).

Psidium piribebuiense Barb. Rodr. ex Chodat & Hassl., Bull. Herb. Boissier 7: 797. 1907. TYPE: PARAGUAY: "Cordillera de Piribebuy," Hassler 6632 (HOLOTYPE G [2 sheets], -ASU photos!).

Psidium submetrale McVaugh, Mem. New York Bot. Gard. 18:261. 1969. TYPE: VENEZUELA. "Bolívar: Entre San Félix y Puerto Ordaz... elev 20 m, 26-27 Jun 1964 (fl)," Steyermark 94275 (HOLOTYPE: MICH!).

Shrub or subshrub ca. 1(–1.5) m high; leaves mainly obovate to oblanceolate, 1.6–3.5 times as long as wide, glabrous to sparsely pubescent beneath, the upper surface usually dull; peduncles mostly under 2 cm long, 1(–3)-flowered; calyx usually quite open in the flower bud before anthesis and before tearing between lobes begins; fruit 1.5–3 cm long; seeds up to ca. 50.

ARGENTINA. Misiones: 7 km de B. de Irigoyen, camino a San Pedro, Dep. Bernardo de Irigoyen, 17 Feb 1973 (fr), Krapovickas et al 23378 (CTES, MO), Candelaria, 3 km S of Arroyo Yabebiry, 4 km S of San Ignacio on ruta 12 (27°15'S, 55°35'W), 11 Dec 1987 (fr), Landrum 5741 (ASU, CTES); Cainguás, Monte

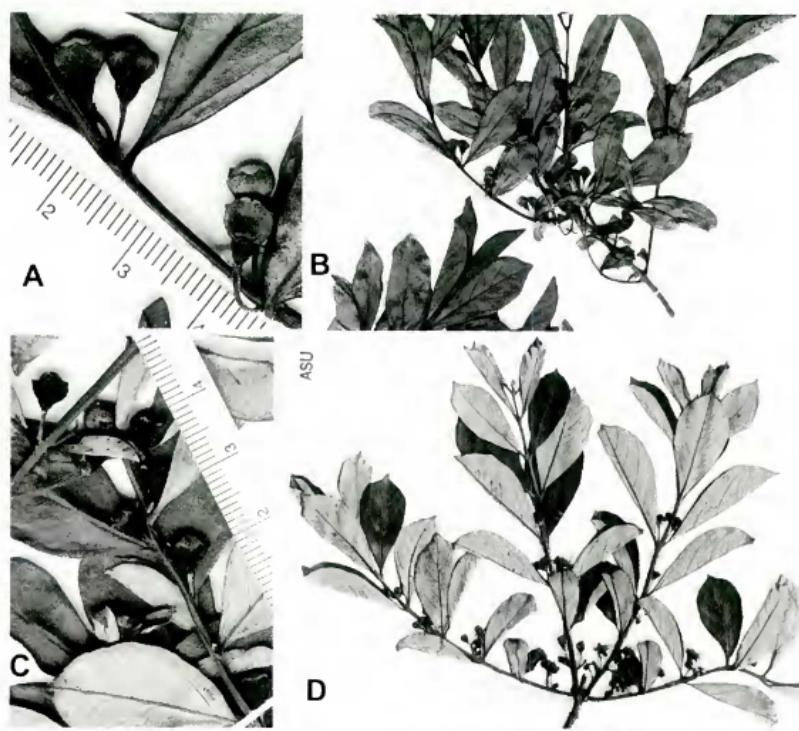


Fig. 1. *A–B. Psidium austale* var. *austale*, Landrum 3909 (NY). **A.** Flower buds, twig and portions of leaves. **B.** Twigs, leaves and flower buds. **C–D.** *Psidium austale* var. *argenteum*. **C.** Mattos 10620 (US), flower buds and leaves; buds are nearly glabrous on hypanthium and calyx; lower leaf surface densely covered with hairs. **D.** Silva 736 (ASU), twigs, leaves and flower buds. In both varieties the calyx is cup-like and open in the flower bud.

Carlo, 205 m, 28 Feb 1955 (fr), Montes I4782 (NY), Cainguás, ruta 8, 1 km S de Campo Grande, camino a Alba Posse, 1 Aug 1987 (fr), Vanni et al. 973 (ASU, CTES).

BRAZIL. **Distrito Federal:** 500 m da margem do lago Paranoá, 9 Nov 1978 (fl), Heringer et al. 699 (NY). **Goiás:** Serra do Caupó, ca. 60 km S of Caapontia on road to Jataí, 800–1000 m, 30 Oct 1964 (fl), Irwin & Soderstrom 7574 (CAS, MICH, NY). **Maranhão:** Imperatriz, Bananal, 15 km S of Imperatriz along BR 010 (ca. 5°40'S, 47°26'W), 290 m, 29 Feb 1980 (fl), Plowman et al. 9351 (NY). **Minas Gerais:** Uberlandia, arredores, 6 Nov 1991 (fl), Hutschbach 55798 (ASU, MBM). **Parana:** Estr. do Cerne, Km 116–117, Campos de Castro, Mun. Castro, 9 Jan 1947 (fl), Hutschbach 581 (MBM, MICH); Ipiranga, Faxinal do Tanque, 20 Dec 1970 (fl), Hutschbach 25899 (ASU); Bocauva do Sul, arredores, 5 Dec 1978 (fl), Hutschbach 41850 (MBM, MO); Mun. Balsa Nova, S. Luis do Puruna, 14 Dec 1979 (fl), Hutschbach 42641 (NY); Rio Branco do Sul, Quebrada Fundo, 5 Dec 1995 (st), Kawasaki et al. 935 (ASU, MBM, SP); Vila Velha, detrás de la iglesia, 15 Jan 1987 (fr), Krapovickas & Cristóbal 40895 (ASU, CTES); Mun. Piraquara, ca. 10 km E of Curitiba (ca. 25°30'S, 49°10'W), 1 Dec 1981 (fl), Landrum 3909 (NY); Mun. Palmeira, Fazenda Santa Rita, ca. 65 km W of Curitiba on rd to Ponta Grossa (ca. 25°25'S, 49°50'W), 2 Dec 1981 (fl), Landrum 3953 (NY); ca. 85 km SW of Guarapuava in campo near Rio Reserva, ca. 1000

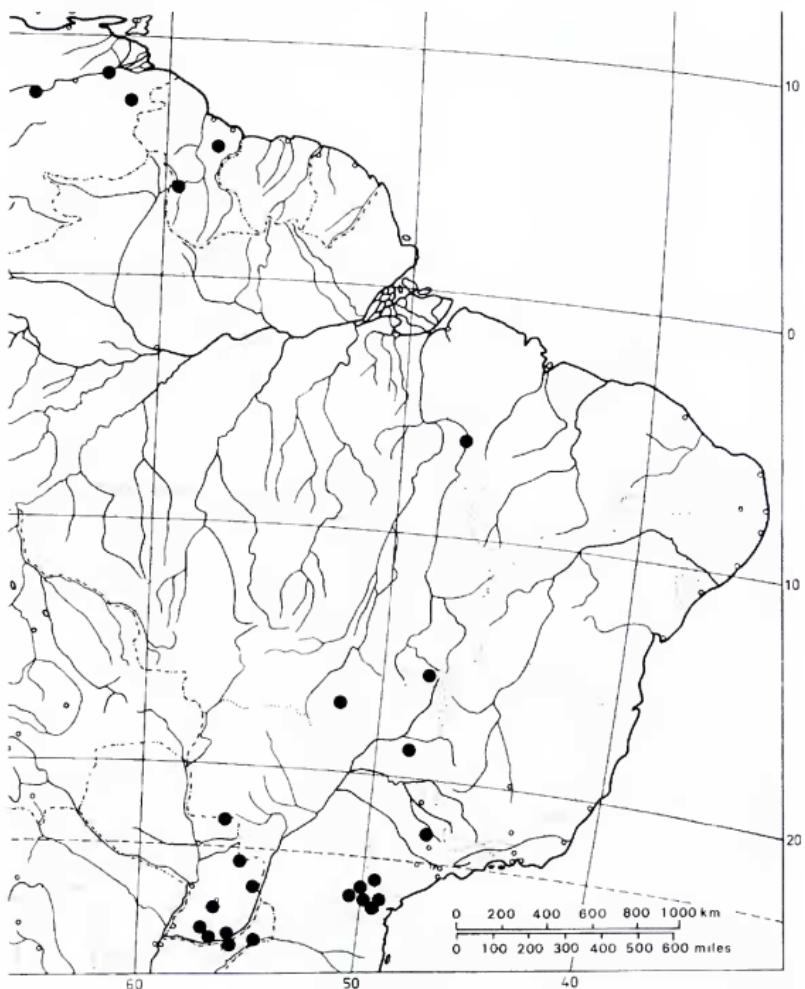


Fig. 2. Distribution of *Psidium australe* var. *australe*.

m, 13 Mar 1967 (fr), Lindeman & de Haas 4834 (MBM, MICH, NY), entre Senges e Jaguariaiva, 20 Nov 1962 (fl), Mattos 10647 (ASU, SP); Mun. Palmeira, Fda. Sta. Rita, 21 Jan 1982 (fr), Oliveira 318 (ASU, MBM); Buraco do Padre, Mun. Ponta Grossa, 24 Nov 1989 (fl), Silva & Nicolack 739 (ASU, MBM). **Roraima:** Normandia, Alto Rio Branco, 11 Jun 1954 (fl), Rodrigues 4475 (MICH). **São Paulo:** Mun. Mogi-Guaçu, 10 km NW of Padua Sales (22°11'-18'S, 47°7'-10'W), 650 m, 22 Sep 1960 (fr), Eiten & Eiten 2394 (NY).

GUYANA. upper Demerara-Berbice region, ca. 27 km from Ituni along Ituni-Kwakwani road (5°22'N, 58°7'W), 30-60 m, 17 Jan 1990 (fr), Gillespie 3000 (ASU); Rupununi Savana, Marakanata Old

Village, ca. 350 ft, 13 Oct 1963 (fl), *Goodland* 989 (MICH, NY); Rupununi Savana, Nappi Village (3°25'N, 59°35'W), 110 m, 29 Nov 1987 (fl), *Jansen-Jacobs et al.* 1319 (MO).

PARAGUAY. Alto Parana: Rva. Tati YUPI, 14 Feb 1979 (fr), *Itaipu Binacional* I61 (MO). **Amambay:** P N. Cerro Corá (ca. 22°35'S, 56°5'W), road to Lorito, ca. 150 m, 20 Aug 1995 (st), *Landrum* 8700 (ASU, FCQ). **Caazapá:** Tavat, destacamento militar (26°10'S, 55°20'W), 30 Oct 1988 (fl), *Basualdo* I734 (MO). **Canendiyu:** circa Ype-jhu, 1 Nov 1978 (fl), *Bernardi* I8306 (NY); Ygatimi, Reserva Natural del Bosque Mbaracayú (ca. 24°10'S, 55°40'W), Nandurocái, 19 Nov 1995 (fr), *Landrum* 8859 (ASU, FCQ). **Itapúa:** Capt. Miranda, 4.2 km N of entrance to Hotel Tirol near CONAVI project (27°12'S, 55°45'W), ca. 210 m, 9 Nov 1995 (fl), *Landrum* 8798 (ASU, FCQ); Capt. Miranda, road to Jesús ca. 0.6 km from main highway (ca. 27°12'S, 55°45'W), ca. 185 m, 9 Nov 1995 (fl), *Landrum* 8816 (ASU, FCQ). **Misiones:** 12 km W de San Ignacio, camino a Pilar, 15 Nov 1978 (fr), *Arbo et al.* 1925 (CTES, MICH, MO); San Juan Bautista, ca. 8.5 km along road to Pilar, ca. 170 m, 8 Nov 1995 (fl), *Landrum* 8789 (ASU, FCQ), rt. 1 between San Ramón to San Patricio at KM A262, ca. 4 km E of rd to Ayolas (ca. 27°5'S, 56°40'W), ca. 240 m, 8 Nov 1995 (fl, fr), *Landrum* 8795 (ASU, FCQ), rt. 1, km A218, E147, between Asunción and Encarnación, ca. 210 m, 10 Nov 1995 (fl), *Landrum* 8825 (ASU, FCQ); Ea. La Soledad, 3 km S de Santiago (56°46'W, 27°10'S), 3-4 Feb 1988 (fr), *Schinini & Vanni* 26054 (ASU). **Paraguari:** Parque Nacional Ybycui, Campo cerrado en NE corner of the park on Arroyo Corrientes (26°03'S, 56°50'W), 21 Dec 1988 (fl), *Zardim et al.* 8980 (MO, PY).

VEZUELA. Bolívar: Mun. Asc. Farrerías, Maripa-Aripao (7°29'N, 65°20'W), 80 m, Feb 1990 (yfr), *Elcono* 759 (MO); Distr. Roscio, ca. 50 km al N de Tumeremo, 450 m, 7 May 1986 (fl), *Huber* II627 (MO); km III on Puerto Ordaz-Cerro Bolívar railroad, 300-350 m, 26 Oct 1953 (fl), *Maguire et al.* 36006 (NY).

The four specimens of *Psidium mucronatum* at G of Hassler 5082 are a mixture of entities. The one specimen most certainly belonging to *P. australe* is chosen as the lectotype. The type of *Psidium triphyllum* might best be placed under *P. australe* var. *suffruticosum*, but I cannot say with certainty based on the photo I have.

Psidium australe var. **argenteum** (O. Berg) Landrum, comb. nov (Fig. 3). *Psidium argenteum* O. Berg, in Mart., Fl. Bras. 14(1):388. 1857. *Psidium argenteum* var. *purpureum* O. Berg, in Mart., Fl. Bras. 14(1):388. 1857, inadmissible name to be replaced by *P. argenteum* var. *argenteum*, the type serving to typify the species. *Guajava argentea* (O. Berg) Kuntze, Revis. Gen. Pl. I:239. 1891. TYPE: BRAZIL: Isotype of *Pargentum* var. *purpureum* O. Berg, here designated as LECTOTYPE of species, "in campus prov. Rio Grande do Sul," Sellow s.n. (SYNTYPE: B, lost; ISOSYNTYPE: P [LECTOTYPE, here designated], -F-36405, -ASU photo!).

Psidium cuneatum Cambess., in A. St.-Hil., Fl. Bras. Merid. 2:283. 1833. *Psidium cuneatum* var. *niveum* O. Berg, in Mart., Fl. Bras. 14(1):405. 1857, inadmissible name to be replaced by *P. cuncatum* var. *cuncatum* *Guajava cunctata* Kuntze, Revis. Gen. Pl. I:239. 1891. TYPE: BRAZIL: "Prope urbem S. João del Rey in provincia Minas Geraes," Saint-Hilaire s.n. (HOLOTYPE: P, -F-36409!, -ASU photo!).

Psidium argenteum var. *angustifolium* O. Berg, in Mart., Fl. Bras. 14(1):388. 1857. TYPE: BRAZIL: "ad pagum Formigas in parte deserta prov. Minarum," Pohl [287.534] (SYNTYPES: W, B, M; syntype at W, -F-31417).

?*Psidium argenteum* var. *grandifolium* O. Berg, in Mart., Fl. Bras. 14(1):388. 1857. TYPE: BRAZIL: "in campus prov. S. Pauli," Sellow s.n. (HOLOTYPE: B, lost).

?*Psidium argenteum* var. *pumilum* O. Berg, in Mart., Fl. Bras. 14(1):388. 1857. TYPE: BRAZIL: "ad S. Ignacio," Sellow s.n. (HOLOTYPE: B, lost).

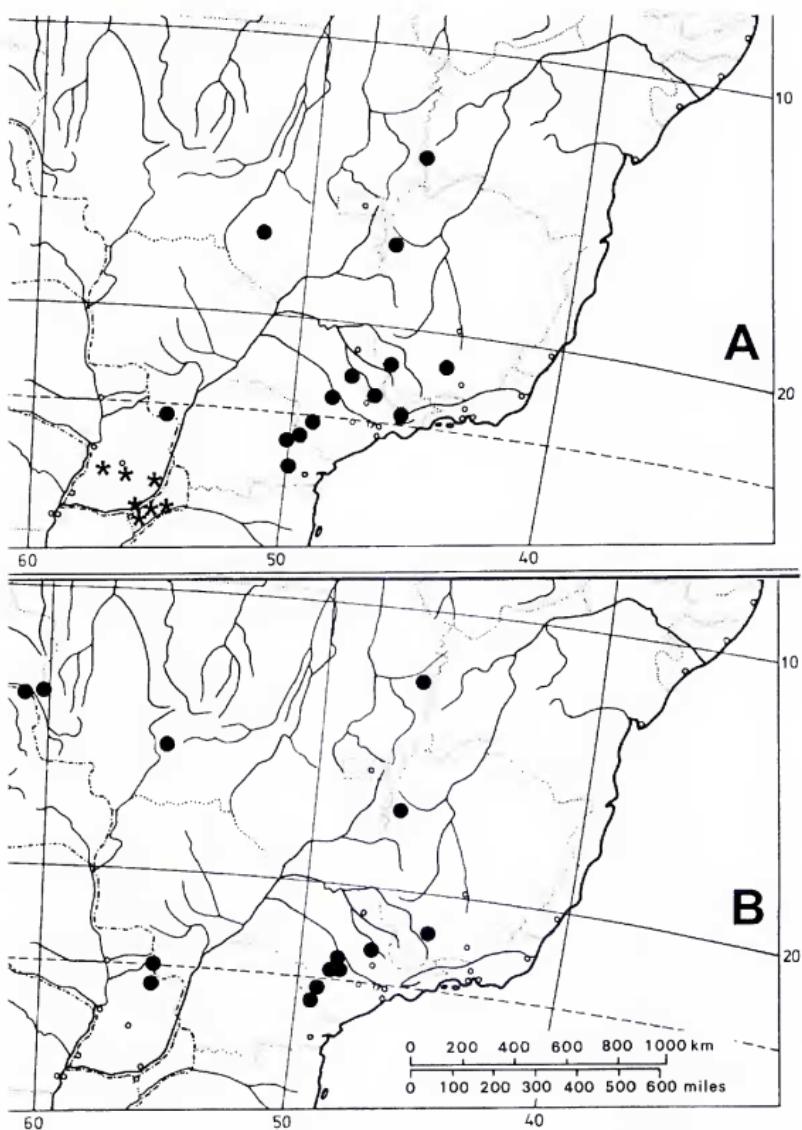


FIG. 3. A. Distribution of *P. australe* var. *argenteum* (dots) and *P. missianum* (stars). B. Distribution of *P. australe* var. *suffruticosum*.

Shrub or subshrub ca. 1(-1.5) m high; leaves mainly obovate to oblanceolate, 1.6-3.5 times as long as wide, densely pubescent beneath, the hairs hiding the underlying surface except for larger veins, the upper surface usually dull; peduncles mostly under 2 cm long, 1(-3)-flowered; calyx usually quite open in the flower bud before anthesis and before tearing between lobes begins; fruit 1.5-3 cm long; seeds up to ca. 50.

BRAZIL. Goias: Serra do Caiapó, ca. 60 km S of Caipomia on road to Jataí ($17^{\circ}12'S$, $51^{\circ}47'W$), 800-1000 m, 27 Oct 1964 (fl), Irwin & Soderstrom 7432 (MICH, MO, NY); Serra Geral de Goiás, ca. 6 km S of Posse ($14^{\circ}S$, $46^{\circ}W$), 800 m, 5 Apr 1966 (fr), Irwin et al. 14393 (NY); Contralorte Central, ca. 26 km NE of Catalão, 875 m, 23 Jan 1970 (fr), Irwin et al. 25224 (NY). **Minas Gerais:** Serinha, (fl), Chira 480 (ASU, SP); Mun. Tijucal, Pedro Less, 13 Mar 1982 (fr), Hatschbach 4706 (ASU); ca. 35 km NW of Paracatu, 1000 m, 8 Feb 1970 (fr), Irwin et al. 26330 (NY); Tiradentes, Serra de São José, 1300-1400 m, 03 Oct 1987 (fl), Penn 320 (ASU). **Parana:** Mun. Jaguariaiva, Fazenda Chapada Santo Antonio, 27 Nov 1968 (fl), Hatschbach 20410 (ASU, MBM); Buraco do Padre, Mun. Ponta Grossa, 24 Nov 1989 (fl), Silva & Cordeiro 736 (ASU, MBM); Mun. Castro, Carambeí by Rio São João (ca. $24^{\circ}30'S$, $50^{\circ}2'W$), 950 m, 15 Jan 1965 (yfr), Smith et al. 14494 (MICH, NY); Mun. Pirai do Sul, near Pirai do Sul (ca. $24^{\circ}20'S$, $50^{\circ}10'W$), 1000-1100 m, 16 Jan 1965 (fr), Smith et al. 14555 (MICH, NY). **São Paulo:** São Carlos, 3.5 km NNW of center of São Carlos ($21^{\circ}59'S$, $47^{\circ}55'W$), 825 m, 14 Jun 1961 (fr), Eiten et al. 2907 (MICH, SP); Botucatu, 18 km N, 14 km E of São Manuel ($48^{\circ}25'W$, $22^{\circ}45'0"S$), 550 m, 28 Sep 1972 (fl), Gottsberger 196R-28972 (ASU); Itirapina, Cerrado do Valério, 19 Oct 1994 (fl), Kinoshita et al. 32196 (ASU); Mun. Itaberaba, Rio Verde, 17 Feb 1982 (fr), Kummnow 1786 (ASU); Mogi-Guaçu, Martinho Prado, Reserva Biológica da Fazenda Campininha, 15 Oct 1980 (fl), Mantovani II63 (ASU, RB, SP); São José dos Campos, a 3 km leste da cidade, 29 Apr 1961 (fr), Mattos 8903 (ASU, SP); Aguas de Santa Barbara, ca. 11 km da cidade em direção a Lençóis, 19 Dec 1995 (fl), Souza & Souza 9634 (ASU); Mogi-Mirim, 9 Dec 1945 (yfr), Viegas 7967 (ASU).

PARAGUAY. Canindeyu: Sierra de Maracayú, Oct 1900 (fl), Hassler 5076 (NY).

Psidium australe var. **suffruticosum** (O. Berg) Landrum, comb. nov. (Fig. 4). *Psidium suffruticosum* O. Berg, in Mart., Fl. Bras. 14(1):387. 1857. *Guajava suffruticosa* (O. Berg) Kuntze, Revis. Gen. Pl. 1:239. 1891. TYPE: BRAZIL: "in pascuis desertorum Brasiliac." Pohl 1021 (HOLOTYPE, B, lost; ISOTYPES: M!, = F-19727!; W! [LECTOTYPE, here designated], - ASU photo!).

Psidium alatum O. Berg, in Mart., Fl. Bras. 14(1):604. 1859. TYPE: BRAZIL: "Serra da Chapada prov. Minarum," Riedel s.n. (HOLOTYPE: LE, - ASU photo!).

Psidium suffruticosum var. *alatum* Kiersev., Enym. Myrt. bras. 27. 1893. TYPE: BRAZIL: "Lagoa Santa," "São Simão," Warming s.n., Lofgren 212; Glaziou 16972 (SYNTYPES: C; ISOSYNTYPE: Glaziou 16972, RI, - ASU photo; ISOSYNTYPE: Lofgren 212, SP!, - ASU photo!).

Shrub or subshrub to ca. 0.3 m high; leaves obovate, oblanceolate or narrowly elliptic, mainly 2-6 times as long as wide, mostly glabrous, the upper surface usually somewhat lustrous; peduncles mostly 1-4 cm long, often 3-flowered (1-flowered peduncles generally present as well); calyx usually nearly closed in the flower bud before anthesis and before tearing between lobes begins; fruit mostly up to 1 cm long; seeds up to ca. 10.

BOLIVIA. Santa Cruz: Velasco, Parque Nacional Noel Kempff Mercado ($13^{\circ}53'41"S$, $60^{\circ}48'46"W$), 500 m, 28 Jan 1997 (fl), Soto et al. 424 (ASU).

BRAZIL. Mato Grosso: Between Buriti and Chapada dos Guimaraes, 720 m, 19 Oct 1973 (fl).

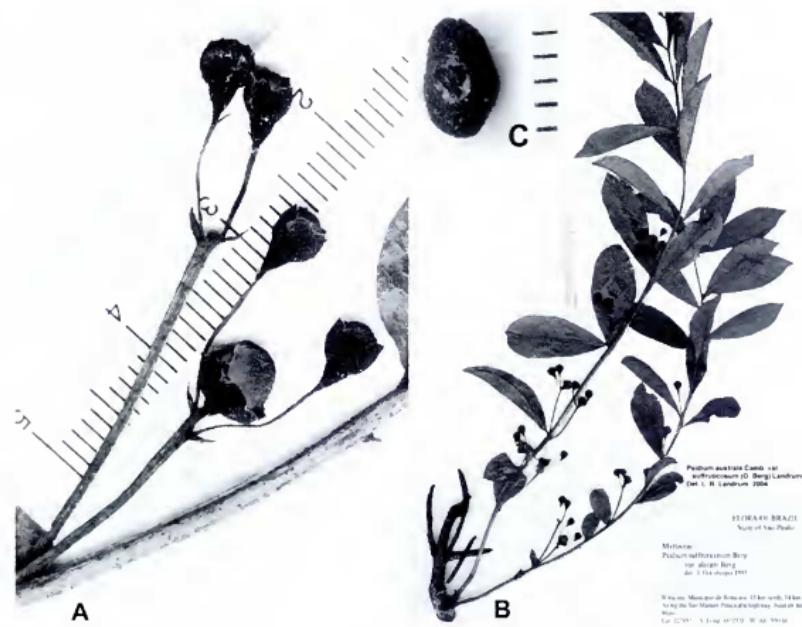


Fig. 4. *Psidium australe* var. *suffruticosum*. A–B. Gottsberger 11-121079 (ASU). A. Dichasial inflorescences with buds, the youngest and uppermost nearly closed; the oldest and lowest with calyx having opened by tears. B. Shoots arising from partially burnt base. Relatively narrow leaves, dichasia and a closed calyx are typical in this variety. C. Heringer & Rizzini 17549 (NY). Apex of flower bud showing nearly closed calyx.

Prance et al. 19225 (NY); (13°50'S, 60°08'W), 29 Nov 1977 (fr), Sílva Costa 1300 (ASU). **Minas Gerais:** Patos de Minas, 800 m, 19 Aug 1950 (fl), Duarte 2825 (NY); Mun. Carmo da Cachoeira, Rod. Fernão Dias, 30 Nov 1985 (fl), Hatschbach 50322 (ASU, MBM); João Pinheiro-Cristalina, 6 Sep 1979 (fl). **Heringer & Rizzini s.n.** (NY, US); Serra da Anta, ca. 10 km NW of Paracatu, ca. 900 m, 3 Feb 1970 (fr), Irwin et al. 25885 (CAS, F, MO, NY). **Paraná:** Jaquariaiva, road to Arapoti near boundary (ca. 24°08'S, 49°20'W), 850–1000 m, 17 Jan 1965 (fr), Smith et al. 14684 (MICH). **São Paulo:** 18 km ao N de Botucatu, 14 km a leste de São Manuel (22°45'S, 48°25'W), perto da Estac. 13 de Maio, 550 m, 22 Nov 1974 (st), Gottsberger & Campos 24-221174 24 (ASU, UB); Itaberaba, Rio Verde, 17 Feb 1982 (fr), Kummrow 1787 (ASU); Itaperininga, 15 km ao N da cidade, 13 Nov 1961 (yfr), Mattos 9576 (ASU, SP), a 37 km de Avaré, rodovia Avaré-São Manoel, 15 Mar 1967 (fr), Mattos 14527 (ASU, SP); São José dos Campos, 7,5 km SW em linha recta da praça principal, 200 m NW da Via Dutra, 600 m, 25 Oct 1961 (fl), Mimura 59 (MICH, NY, SP); Mogi-Guaçu, Padua Sales, Res. Biológica da Fazenda Campininha, 24 Nov 1977 (fr), Sakane 698 (ASU); Itararé, Estação Ecológica de Itapeva (24°04'25"S, 49°03'09"W), 12 Nov 1994 (fl), Souza et al. 7037 (ASU, SP); Angatuba, Estrada para Itatinga, ca. 29 km de Angatuba (23°18'48.1"S, 48°31'35.1"W), 610 m, 2 Jan 1996 (yfr), Souza et al. 10752 (ASU).

PARAGUAY. Amambay: Sierra de Amambay, Oct 1912 (fl), Hassler 11401 (F, LIL, NY). **Canindeyu:** Ygatimí, Res. Natural del Bosque Mbaracayú, Nanduocai (ca. 24°10'S, 55°40'W), 19 Nov 1995 (fl), Landrum 8857 (ASU, FCQ).

Psidium grandifolium DC., Prodr. 3:234. 1828. (**Figs. 5, 6**). *Psidium grandifolium* var. *geninum* O. Berg, in Mart., Fl. Bras. 14(1):406. 1857, inadmissible name to be replaced by *P. grandifolium* var. *grandifolium*. *Guajava grandifolia* (DC.) Kuntze, Rev. Gen. Pl. I:239. 1891. TYPE BRAZIL: "ad Ypanema prov. S. Pauli," *Martius* s.n. (HOLOTYPE M!, =F-19713).

Psidium cinereum DC., Prodr. 3:234. 1828. *Guajava cinerea* (DC.) Kuntze, Revis. Gen. Pl. I:239. 1891.

Psidium cinereum var. *angustifolium* O. Berg, in Mart., Fl. Bras. 14(1):403. 1857, inadmissible name to be replaced by *P. cinereum* var. *cinerum*. TYPE BRAZIL: "prov. Sancti Pauli," *Martius* s.n. (HOLOTYPE M!, =F-19723, =ASU photo).

Psidium incanescens DC., Prodr. 3:234. 1828. *Guajava incanescens* (DC.) Kuntze, Revis. Gen. Pl. I:239. 1891. *Psidium incanescens* var. *cuneatum* O. Berg, in Mart., Fl. Bras. 14(1):403. 1857, inadmissible name to be replaced by *P. incanescens* var. *incanescens*. *Psidium cinereum* DC. var. *incanescens* (DC.) D. Legrand, Fl. Illustr. Catarin., Mirtáceas. 692. 1977. TYPE BRAZIL: "prope Taubate prov. S. Pauli," *Martius* s.n. (HOLOTYPE M, =ASU photo).

Psidium ternatifolium Cambess., in A. St.-Hil., Fl. Bras. Merid. 2:278. 1833. *Psidium grandifolium* var. *ternatifolium* (Cambess.) O. Berg, in Mart., Fl. Bras. 14(1):407. 1857. TYPE BRAZIL: "Fazenda das Lages in provincia S. Pauli," *Saint-Hilaire* s.n. (HOLOTYPE Pl., =ASU photo).

Psidium cinereum var. *brevipes* O. Berg, in Mart., Fl. Bras. 14(1):404. 1857. TYPE BRAZIL: "in prov. Minarum," Claussen 527 (HOLOTYPE BR; ISOTYPE G, = F-234929).

Psidium grandifolium var. *intermedium* O. Berg, in Mart., Fl. Bras. 14(1):407. 1857. TYPE BRAZIL: "prov. Rio Grande do Sul," Sellow s.n. (HOLOTYPE B, lost; ISOTYPE P! [LECTOTYPE, here designated], =ASU photo).

Psidium grandifolium var. *heterophyllum* O. Berg, in Mart., Fl. Bras. 14(1):407. 1857. TYPE BRAZIL: "prov. Minarum," Claussen 527 (HOLOTYPE W; ISOTYPE LE, =ASU photo).

Psidium grandifolium var. *tenuinerve* O. Berg, in Mart., Fl. Bras. 14(1):407. 1857. TYPE BRAZIL: "prov. Minarum prope urbem S. João," Pohl 3630 (HOLOTYPE W, =ASU photo).

Psidium cinereum var. *intermedium* O. Berg, in Mart., Fl. Bras. 14(1):404. 1857. TYPE BRAZIL: "prope urbem Barbacena prov. Minarum ad Urbem Ypanema prov. S. Pauli," *St. Hilaire*, *Martius*, Sellow s.n. (SYNTYPES B, lost; ISOTYPE P! [LECTOTYPE, here designated], =ASU photo).

Psidium incanescens var. *parvifolium* O. Berg, in Mart., Fl. Bras. 14(1):403. 1857. TYPE BRAZIL: "prov. Minarum...S. João del Rey, Chapeo d'Uvas," *St. Hilaire*, Widgren 529. White 4163 (SYNTYPES M, MEL; possible ISO-SYNTYPES LE, Pl., =ASU photo, RI).

Psidium incanescens var. *rotundifolium* O. Berg, in Mart., Fl. Bras. 14(1):403. 1857. TYPE BRAZIL: "prov. Rio Grande do Sul. S. Rita et S. João Baptista ad Paracatu," Sellow, Pohl 500 & 729 (SYNTYPES B, lost; ISO-SYNTYPE [Pohl 500], W! [LECTOTYPE, here designated] = F-31423, =ASU photo; ISO-SYNTYPE [Pohl 729], W!, =ASU photo).

Psidium cuneatum var. *incanescens* O. Berg, in Mart., Fl. Bras. 14(1):405. 1857. TYPE BRAZIL: "in eadem prov." [i.e., Minas Gerais] Regnelli I-129 (HOLOTYPE MEL, =ASU photo).

Psidium grandifolium var. *albidum* O. Berg, in Mart., Fl. Bras. 14(1):603. 1859. TYPE BRAZIL: "Prope Pindamonhangaba et Taubate," Riedel s.n. (HOLOTYPE LE, =ASU photo).

Psidium grandifolium var. *incanescens* O. Berg, in Mart., Fl. Bras. 14(1):603. 1859. TYPE BRAZIL: "Prope Pindamonhangaba et Taubate," Riedel s.n. (HOLOTYPE LE, =ASU photo).

Psidium riedelianum O. Berg, in Mart., Fl. Bras. 14(1):603. 1859. TYPE BRAZIL: "prope villam Jaguara prov. Minarum," Riedel s.n. (apparent HOLOTYPE LE, =ASU photo?).

Psidium eriophyllum Barb. Rodr., Myrt. Paraguay 12. 1903. TYPE PARAGUAY: "vicine Rio Igatemy, prope Yerbales Serra Maracayu," Hassler 5659 (HOLOTYPE [2 sheets], G, =ASU photo).

Psidium lanatum Barb. Rodr., Myrt. Paraguay 13. 1903. TYPE PARAGUAY: "Ipe hu...Serra Maracayu," Hassler 5263 (HOLOTYPE G, =ASU photo).

Psidium spodophyllum Barb. Rodr., Myrt. Paraguay 14. 1903. TYPE PARAGUAY: "prope Rio Corrientes," Hassler 4521 (HOLOTYPE G, =ASU photo).



FIG. 5. *Psidium grandifolium*. A-B. Irwin & Soderstrom 7173 (NY). A. Young shoots arising from woody base. B. Nearly closed flower buds (northern form). C. Landrum 8810 (ASU), calyx open in bud, the lobes triangular (southern form). Densely white tomentose flowers and lower leaf surfaces are typical of this species.

Psidium apaense Barb. Rodr. ex Chodat & Hassl., Bull. Herb. Boissier 7:798. 1907. TYPE: PARAGUAY: "in regione cursus superioris fluminis Apa," Hassler 8529 (HOLOTYPE: G, = ASU photo).

Psidium apaense Barb. Rodr. ex Chodat & Hassl., Bull. Herb. Boissier 7:798. 1907. TYPE: PARAGUAY: "pr. Curuguaty," Hassler 4648 (HOLOTYPE: [2 sheets], G, = ASU photos!).

Psidium paraguayense Barb. Rodr. ex Chodat & Hassl., Bull. Herb. Boissier 7:798. 1907. TYPE: PARAGUAY: "pr. Igatimi," Hassler 4831 (HOLOTYPE: [3 sheets], G, = ASU photos).

Psidium psychophyllum Barb. Rodr. ex Chodat & Hassl., Bull. Herb. Boissier 7:797. 1907. TYPE: PARAGUAY: "in alta-planitic Loma guazu in valle fluminis Y-aca," Hassler 6805 (HOLOTYPE: [2 sheets], G, = ASU photos!).

Psidium yacaense Barb. Rodr. ex Chodat & Hassl., Bull. Herb. Boissier 7:797. 1907. TYPE: PARAGUAY: "pr. Valenzuela," Hassler 7099 (HOLOTYPE: G, = ASU photo).

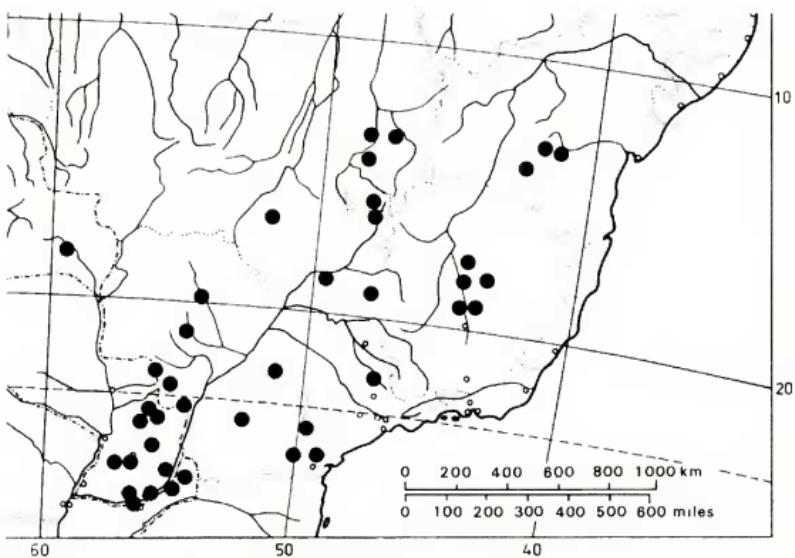


Fig. 6. Distribution of *Psidium grandifolium*.

Psidium cinereum var. *paraguariae* D. Legrand, Fl. Illustr Catarin., Mirtaceas 694. 1977. TYPE: PARAGUAY: Rosengurt 5407 (HOLOTYPE MVM); Pedersen 4366 (isoparatypes MO, NY!; -ASU photo).

Shrub to ca. 1.5 m high, densely white tomentose or pubescent on young growth; hairs white (sometimes with a reddish-brown tinge), simple, up to ca. 1.5 mm long; young twigs often square in cross section, especially in vigorous growth, densely white tomentose. **Leaves** elliptic, obovate, oblanceolate, lanceolate, (rarely suborbicular), 3.6–12 cm long, 2–5.8 cm wide, 1.7–3 times as long as wide, densely white tomentose below, sparsely hairy to glabrescent above when mature, often with somewhat longer, persistent hairs along the midvein above; apex acute, rounded, acuminate, often with a cuspidate tip; base acute, obtuse, rounded, or cuneate; petiole 1–6 mm long, 1–2 mm thick, channeled or not; midvein impressed to flat above, prominent below, the venation usually eucamptodromous proximally to brochidodromous distally, the lateral veins usually 4–7, ascending, a clear marginal vein not present, the smaller tertiary veins obscure or forming an irregular reticulate pattern, sometimes impressed above; blades subcoriaceous to stiffly coriaceous, dull to lustrous above, drying dark reddish brown to gray-green. **Flower buds** pyriform, 6–15 mm long; peduncles 0.2–5 cm long, 1–2 mm thick; bracteoles linear to narrowly elliptic, 2–8 mm long, pubescent to tomentose without, glabrous to tomentose within; ca-

lyx connate as a tube for 1–4 mm, tearing between the lobes or irregularly at anthesis, the lobes before anthesis deltoid, much wider than long, or about as wide as long (sometimes scarcely perceptible along the rim of the closed calyx), densely covered with hairs within and without; petals elliptic to obovate, 9–10 mm long, glabrous within, pubescent without; hypanthium obconic to subhemispheric, (2–)3–7 mm long, densely tomentose; disk 5–9 mm across, subglabrous to pubescent; stamens (80–)260–560, 4–11 mm long; anthers oblong, 0.8–1 mm long, with 1–3 glands in the connective; style 5–10 mm long; ovary 2–5-locular; ovules 25–80 per locule, ca. 6-seriate, the placenta not peltate, hidden by an obconic mass of ovules. **Fruit** subglobose, 1–2.5 cm in diameter; seeds (2–)3–4(–6) mm long, smooth, rounded, 19–85 per fruit.

ARGENTINA. *Corrientes*: Depto. Ituzaingo, 7 km S of Río Aguapey on Ruta 39 (ca. 27°35'S, 56°15'W), ca. 120 m, 9 Dec 1987 (fl), Landrum 5704 (ASU, CTES). *Misiones*: San Ignacio, new road to Loreto, ca. 1 km from Ruta 12, 11 Dec 1987 (fl), Landrum 5731 (ASU, CTES); Eldorado, 180 m, 12 Jan 1955 (fr), Montes I4743 (CAS, NY); Cainguás, Monte Carlo, 205 m, 12 Apr 1955 (ofl), Montes I4794 (CAS, NY).

BOLIVIA. *Chiquitos*: 3–5 km al NE de Santiago de Chiquitos (18°20'S, 59°35'W), 500–700 m, 22 Oct 1994 (fl), Vargas 3496 (ASU).

BRAZIL. *Bahia*: Mun. Caetité, 6 km S de Caetité camino a Brejinho das Ametistas (ca. 14°2'S, 42°32'W), ca. 1090 m, 20 Nov 1992 (fl), Arbo *et al.* 5627 (ASU, CTES, SPF); Mun. Ibiquara, 25 km ao N de Barra da Estiva na estrada nova para Mucuge (13°25'S, 41°18'W), 1100–1200 m, 20 Nov 1988 (fl), Harley *et al.* 26964 (ASU, CEPEC); Piata, proximo a serra do Gentio (Gerais, entre Piata e Serra da Tromba), 21 Dec 1984 (fl), Stannard *et al.* 7418 (ASU). **Distrito Federal**: Brasilia, Zoobotânico, 10 Oct 1961 (fr), Heringer 8912 (NY). Goiás: Minacu, a 8.9 km do norte do canteiro de obras (13°29'S, 48°24'W), 950 m, 11 Mar 1992 (fr), Cavalcanti *et al.* II55 (ASU); Niquelandia, ca. de 6 km da Vila Macedo em direccão a mina de níquel (14°21'27"S, 48°24'20"W), 30 May 1996 (fl), Fonseca *et al.* 976 (ASU); Rod. GO-118, 2–5 km O de Alto Paraiso, 15 Oct 1990 (fl), Hatschbach 54567 (MBM); Mun. de Luzania, 5 Jul 1979 (fr), Heringer 17352 (NY); Serra do Caiapó, ca. 37 km S de Caiaponia on rd. to Jataí, 800–1000 m, 22 Oct 1964 (fl), Irwin & Soderstrom 7173 (MICH, MO, NY); Chapada dos Veadeiros, 19 km N of Altôdo Paraiso, ca. 1250 m, 20 Mar 1971 (fr), Irwin *et al.* 32824 (NY). **Mato Grosso do Sul**: Amambai, 10 Dec 1982 (fl), Hatschbach 45864 (MBM); Rod. MT-624, 5 km W de Tacuru, 16 Dec 1983 (fl, yfr), Hatschbach 47309 (ASU, MBM); Rio Brilhante, Rod. BR-167, 14 Aug 1970 (fl), Hatschbach 24632 (MBM); Bandeirante, Rod. Br 163, 11 Nov 1973 (fl), Hatschbach 33044 (MBM). **Minas Gerais**: Joaquim Felicio, Serra do Cabral, Bocaina, 23 Nov 1984 (fl), Giulietti *et al.* CFCR 6399 (ASU); Melo, 3 km N of Herto, Paraopeba, 30 Nov 1965 (fl), Goodland 265 (NY); Mun. Indianópolis, Fazenda Bela Tanda (19°3'S, 47°57'W), 850 m, 27 Sep 1990 (fl), Gottsberger II-27990 (ASU); Serra do Espinhaço, ca. 7 km NE of Diamantina, road to Mendanha, 1300 m, 29 Jan 1969 (fr), Irwin *et al.* 22839 (MO, NY); BR-365, Corrego Fundo, 25 km E de Ituiutaba, 4 Jan 1989 (fr), Krapovickas & Cristóbal 42785 (ASU); Serra do Cipó, between Veu da Noiva and Alto do Palacio (ca. 19°15'S, 43°40'W), 1000–1400 m, 31 Jan 1984 (yfr), Landrum 4245 (NY); Diamantina, Área de Proteção Ambiental Pau de Fruta (18°15'29"S, 43°38'54"W), 14 Feb 2001 (fl), Lombardi 4259 (ASU); Datas, Morro do Coco, estrada para Diamantina, 18°26'S, 1300 m, 21 Mar 1989 (fr), Mello-Silva & Pirani CFCR 12206 (SPF). **Paraná**: Jaguariaiva, Lageado 5 Reis, 860 m, 3 Dec 1964 (fl), Hatschbach II1939 (HB, MBM); Ponta Grossa, Parque V. Velha, 25 Feb 1967 (fr), Hatschbach I6076 (MBM); Bocaiuva do Sul, arredores, 5 Dec 1978 (fl), Hatschbach 41927 (CTES, MBM); Alm. Tamandaré, Rod. dos Mineros, rio Barigui, 9 Feb 1982 (fl), Hatschbach 44566 (MBM); Campo Mourão, 8 Dec 1965 (buds), Hatschbach *et al.* 13293 (MBM); Rio Branco do Sul, Serra do Caeté, 5 Dec 1995 (fl), Kawasaki *et al.* 929 (ASU, MBM, SP). **São Paulo**: Mun. Mogi-Guaçu, 3.7 km NNW of Padua Sales (22°11'18"S, 47°7'10"W), 575–650 m, 13 Dec 1962 (fr), Eiten & Eiten 5069 (MO, SP); Capão Bonito, rodovia para Itararé, Sep 1967 (fl), Handro II97 (SPF); Mun. Mogi-Guaçu, Martinho Prado, Reserva

Biológica da Fazenda Campininha, 17 Oct 1980 (II), *Mantovani* 1234 (SP); Rancharia, Rod. Raposo Tavares, km 515.5 (22°24'52.9"S, 51°2'35.2"W), +30 m, 14 Feb 1996 (fr), *Souza & Souza* I0896 (ASU).

PARAGUAY. **Amambay:** camino a Colonia Estrella, 1 km W del Hito (55°45'W, 22°22'S), 500 m, 10 Dec 1997 (fr), *Schinini & Dematteis* 33633 (ASU); Estancia San Victor, Potrero Toro, 25 Oct 1991 (II), *Soria* 4929 (CTES). **Caaguazu:** Arroyo Yuquyry-Arroyo Taruma, 4 km N of Arroyo Yuquyry (25°13'S, 55°55'W), 12 Jan 1991 (fr), *Zardini & Vélazquez* 25882 (ASU). **Caazapá:** Tavai, destacamento militar (26°10'S, 55°20'W), 30 Oct 1988 (fl), *Basualdo* 1732 (ASU, FCQ). **Canindeyu:** Ygatimi, Res. Natural del Bosque Mbaracayu, Nandurocaí (ca. 24°10'S, 55°40'W), 19 Nov 1995 (fl), *Landrum* 8855 (ASU, FCQ). **Itapúa:** Capitán Miranda, 4.2 km N of entrance to Hotel Tirol beside CONAVI project (ca. 27°12'S, 55°45'W), ca. 210 m, 13 Aug 1995 (fr), *Landrum* 8661 (ASU, FCQ), road to Jesús, 0.6 km from main highway (ca. 27°12'S, 55°45'W), ca. 185 m, 9 Nov 1995 (II), *Landrum* 8810 (ASU, FCQ); San Juan Bautista, 8.5 km along road to Pilar, ca. 170 m, 8 Nov 1995 (st), *Landrum* 8792 (ASU, FCQ); route 1 ca. 4 km E of road to Ayolas at km A262 (ca. 27°5'S, 56°40'W), ca. 240 m, 8 Nov 1995 (II), *Landrum* 8794 (ASU, FCQ); Ea. La Soledad, 3 km S de Santiago (56°46'W, 27°10'S), 3-4 Feb 1988 (fr), *Schinini & Vanni* 26053 (ASU). **Paraguarí:** Salto de Pirareta, 14 Nov 1978 (fr), *Arbo et al.* 1754 (NY); route 1 near km 246, ca. 0.5 N or road to Lago Ypoa (26°S, 57°15'W), ca. 250 m, 7 Nov 1995 (II), *Landrum* 8766 (ASU, FCQ); National Park Ybycui, Arroyo Corrientes (26°00'S, 56°46'W), 10 Feb 1993 (fr), *Zardini & Guerrero* 34974 (ASU). **San Pedro:** 36 km N de Tacuara, Ea. La Manina (24°22'S, 56°24'W), 21 Oct 1994 (II), *Krapovickas et al.* 45798 (ASU, CTES); 70 km N de Tacuara (24°1'S, 56°5'W), 15 Dec 1986 (fr), *Perez et al.* H65 (ASU).

De Candolle (1828) simultaneously described three species of *Psidium* in his Prodromous based on Martius collections and using names applied by Martius in his herbarium: *P. grandifolium*, *P. cinereum*, and *P. incanescens*. De Candolle expressed doubt that *P. incanescens* and *P. cinereum* were distinct. In fact all three type specimens are similar and I think it is best to consider them a single species. Legrand (Legrand & Klein 1977) united *P. cinereum* with *P. incanescens* [i.e., *Psidium cinereum* var. *incanescens* (O. Berg) D. Legrand], but no one has united *P. grandifolium* with either of the others. As I discussed before there are a continuum of forms of *Psidium* in this complex and I choose the name *P. grandifolium* because the type is most clearly distinct from its relatives *P. australe*, *P. missionum* and intermediates. The name *P. cinereum*, the other alternative, has been applied to a wide variety of forms, some of which I now include in *P. australe*.

Psidium grandifolium is a variable species. In the southern part of its range (Argentina and southern Paraguay) there are individuals with clearly deltoid triangular calyx-lobes 2-5 mm long that are longer than wide and longer than the calyx-tube (Fig. 5C). These often have narrowly elliptic leaves that are subcoriaceous. Mixed with these are others with broader subcoriaceous leaves and shorter, broader calyx-lobes. Towards the north of Paraguay and into Brazil the leaves become more coriaceous and the calyx-lobes less prominent, in some cases being scarcely perceptible along the rim of the calyx-tube, and the calyx-tube becomes longer (Fig. 5B). These forms may warrant recognition at a subspecific level.

The name *Psidium cuneatum* Cambess. has been applied to this species in Argentina by Rotman (1976) who was apparently following the opinions of Legrand and Kausel (both cited in Rotman). I have been able to carefully study the type of *P. cuneatum* and believe that it is a synonym of *P. australe* var. *argenteum*.

From a broad area of Brazil (Bahia to Paraná), there exist collections of plants intermediate between *P. australe* and *P. grandifolium*. In other areas these species remain quite distinct and do not intermix. After several years of consideration of this situation I believe that it is best to simply accept some specimens as belonging to the complex but as intermediates. The alternative would be to unite the whole group in to one extremely variable species with subspecific groups that act as separate species over much of their distribution. Intermediates include types of the following taxa:

Psidium microcarpum Cambess., in A. St.-Hil., Fl. Bras. Merid. 2:284. 1833. TYPE BRAZIL: "Prope urbem S. João del Rey in provincia Minas Geraes," Saint-Hilaire s.n. (HOLOTYPE: Pl. =F-36416!, -ASU photo).

Psidium sericeum O. Berg, in Mart., Fl. Bras. 14(1):389. 1857. TYPE BRAZIL: "in campis ad Carambeí in prov. S. Pauli," Sellow s.n. (HOLOTYPE: B, lost; ISOTYPES: LE, -ASU photo!, Pl. [LECTOTYPE, here designated], -F-36421!, -ASU photo!).

Psidium grandifolium var. *parvifolium* O. Berg, in Mart., Fl. Bras. 14(1):407. 1857. TYPE BRAZIL: "prov. Minarum," Regnell I-129 (HOLOTYPE MEL; ISOTYPE: Pl. = ASU photo!).

Psidium cinereum var. *grandifolium* O. Berg, in Mart., Fl. Bras. 14(1):404. 1857. TYPE BRAZIL: "in prov. S. Pauli," Sellow s. n. (HOLOTYPE: B, lost; ISOTYPE: Pl. [LECTOTYPE, here designated], = ASU photo!, Pl. = ASU photo!).

Specimens that I consider intermediate between *Psidium grandifolium* and *P. australe* include the following.

BRAZIL. Bahia: Serra da Agua de Rega, 23 km N of Seabra, road to Agua de Rega, ca. 1000 m, 24 Feb 1971 (fr), Irwin et al. 30894 (HB, MBM, MO, NY). **Distrito Federal:** Horto do Guará, Brasilia, 15 Dec 1961 (fl), Heringer 8773 (ASU, HB); na Rod. da RECOR no trecho entre a RECOR e DNER, 20 Nov 1978 (fl), Heringer et al. 17180 (ASU, HB); Brasilia, Bacia do São Bartolomeu, alto do Ribeirao Papuda, 18 Feb 1981 (fr), Heringer et al. 6221 (MO, NY); near Sobradinho, 1100 m, 27 Sep 1965 (fl), Irwin et al. 8717 (CAS, MICH, MO, NY); ca. 12 km W of Taguatinga on road to Brasilandia, 1250 m, 26 Nov 1965 (fl), Irwin et al. 10692 (NY); Chapada da Contagem, ca. 15 km E of Brasilia, 1050 m, 30 Jan 1966 (fr), Irwin et al. 12154 (MICH, MO, NY). **Goiás:** São Gabriel, arredores, 7 Nov 1991 (fl), Hatschbach 55874 (ASU, MBM); Luziânia, 11 Feb 1982 (fl), Heringer 18279 (MO, NY); Serra dos Cristais, 5 km W of Cristalina (17°S, 48°W), 1175 m, 2 Nov 1965 (fl), Irwin et al. 9766 (MICH, NY); Serra do Rio Preto, ca. 10 km E of Cabaceiras (16°S, 47°W), 1000 m, 17 Nov 1965 (fl), Irwin et al. 10377 (HB, MICH, MO, NY, SP); Serra do Pirineus, ca 12 km S of Corumbá de Goiás (16°S, 49°W), 1000 m, 1 Dec 1965 (fl), Irwin et al. 10855 (MICH, MO, NY); Mun. de Alexania, 5-7 km from BR060 on road to Rio Corumbá, ca. 12 km W of Alexania, 1000 m, 21 Jul 1984 (fl), Mori et al. 16920 (NY); Morrinhos, fazenda proxima da cidade (17°49'22"S, 49°33'9"W), 6 Sep 1998 (fr), Proença 1987 (ASU). **Mato Grosso do Sul:** Rod. BR-267, 20 km W de Maracajú, 25 Oct 1988 (fl), Hatschbach 52614 (ASU). **Minas Gerais:** 6 km NE of Indianópolis (19°13'0"S, 47°57'0"W, 850 m, 2 Nov 1985 (fl), Gottsberger 16-21185 16 (ASU); Morro das Pedras, ea. 40 km NE of Patrocínio, 1000 m, 29 Jan 1970 (fr), Irwin et al. 25696 (NY); Serra da Anta, ca. 5 km NW of Paracatú, 800 m, 4 Feb 1970 (fr), Irwin et al. 25998 (MO, NY); Rio Bicudo, ca. 20 km W of Corinto, ca. 525 m, 3 Mar 1970 (fr), Irwin et al. 26826 (CAS, NY); Ituiutaba, 24 Oct 1956 (fl), Macedo 4853 (US); Diamantina, proximo a Guinda, 9 Jan 1988 (fl), Mello-Silva et al. II758 (ASU). **Paraná:** Parque Iguaçú, Mun. Curitiba, 14 Jan 1986 (fr), Cordeiro & Silva 217 (ASU, HRB, MBM); Mun. Colombo, Capivari, 4 Nov 1971 (fl), Hatschbach 27710 (ASU, MBM); Mun. Jaguariaiva, Rio das Mortes, 25 Nov 1980 (fl), Hatschbach 43870 (ASU, MBM); Mun. Palmeira, Rod. BR-277, descida rio Capivara, 8 Mar 1984 (fl), Hatschbach 47837 (ASU, MBM); Mun. Mandirituba, Cachoeira and surroundings to Rio Barigui (ca. 25°45'S, 49°15'W), 30 Nov 1981 (fl), Landrum 3887 (MICH, NY); Curitiba, Parque Iguaçú (ca. 25°30'S,

49°15'W), ca. 900 m, 2 Jan 1982 (fl, yfr), *Landrum* 4044 (MBM, NY); Rio Branco do Sul, along rd to Cerro Azul (ca. 25°S, 49° 20'W), 900 m, 5 Jan 1982 (lr), *Landrum* 4053 (MBM); Br 476, 5 km O de Lapa, 30 Nov 1989 (fl), *Ribas* 199 (ASU, MBM). **São Paulo:** Mococa, 7 Nov 1994 (ll), Kinoshita & Galvao 94-144 I-4 (ASU); Cassia dos Coqueiros, 9 Nov 1994 (ll), Kinoshita & Galvao 94-217 217 (ASU); Botucatu, 22 Nov 1968 (ll), Sendulsky 867 (ASU, NY, SP).

Psidium missionum D. Legrand, *Darwiniana* 9:284, 1950. (**Fig. 7.**) TYPE: ARGENTINA. "Misiones, Depto. Candelaria, Santa Ana," Rodriguez 16 (HOLOTYPE: MVM; ISOTYPES: Fl. = ASU photol, LIL, SI).

Shrub or subshrub to ca. 1 m high, with a persistent underground stem from which shorter lived above ground shoots arise, resprouting after being burnt or cut to the ground, glabrous to moderately pubescent on young growth; hairs when present whitish, up to ca. 1 mm long but usually shorter; young twigs reddish brown, glabrous to pubescent, less often pubescent, reddish-brown, smooth, the older twigs at first scaly, later smooth, gray. **Leaves** oblanceolate, obovate, or elliptic, 2.5–8.8 cm long, 1.1–4 cm wide, 1.8–3.5 times as long as wide; apex abruptly acuminate to acute; base cuneate to acute; petiole 1–2 mm long, 1–1.5 mm thick, flat or channeled above; midvein flat to slightly impressed above, prominent below; lateral veins usually 4–6 pairs ascending and arching upwards, connecting to form a weaker marginal vein in the upper half, the smaller tertiary veins between the laterals forming a reticulate pattern; blades lustrous or not above, drying olive green, gray-green, to blackish brown, nearly concolorous, coriaceous. **Flower buds** pyriform, 7–12 mm long; peduncles 1(–3)-flowered, 1–2.3 cm long, ca. 1 mm wide, flattened, pubescent to glabrous; bracteoles linear to narrowly lanceolate, 3–8 mm long, ca. 1 mm wide, glabrous to pubescent, deciduous at about anthesis; calyx open in the bud, tearing up to ca. 1 mm between the lobes after anthesis, the lobes triangular, 2–4 mm long, 3–4 mm wide, subglabrous to pubescent, the apex acute to acuminate; petals obovate to oblanceolate, ca. 9 mm long, glabrous to subglabrous; hypanthium obconic, 3–5 mm long, glabrous to pubescent; disk 4–6 mm across, the staminal ring pubescent; stamens 130–235, 9–11 mm long; anthers subglobose to oblong, ca. 0.5–1 mm long; style 7–9 mm long, usually with a few scattered hairs, the stigma only slightly wider than style; ovary 3–4-locular; ovules 43–70 per locule, about 8-seriate, the placenta not peltate, hidden by ovules. **Fruit** globose, ca. 1–1.5 cm long; seeds 14–20 in fruits seen, ca. 5 mm long, the seed coat several cells thick.

ARGENTINA. Misiones: San Ignacio, ca. 3 km along road to Pena Victoria, Teyu Cuare (ca. 27°15'S, 55°35'W), 10 Dec 1987 (fr), *Landrum* 5718 (ASU, CTES); Candelaria, 4 km S of Santa Ana on ruta 12 (27°25'S, 55°40'W), 11 Dec 1987 (fl), *Landrum* 5735 (ASU); San Ignacio, new road to Loreto, ca. 1 km from ruta 12, 11 Dec 1987 (fr), *Landrum* 5738 (ASU); Candelaria, 3 km S of Arroyo Yabebiry, 4 km S of San Ignacio on ruta 12 (27°15'S, 55°35'W), 11 Dec 1987 (st), *Landrum* 5740 (ASU, CTES); Cainguás, Monte Carlo, 205 m, 2 Feb 1955 (lr), *Montes* I-4806 (CAS, NY).

PARAGUAY. Caazapá: Tavai, destacamento militar (26°10'S, 55°20'W), 1988 (fl), Basualdo 2076 (FCQ). **Guaira:** Del Guaira Iturbe, 0.50–0.80 m, 3 Oct 1952 (ll), *Montes* I-260 (CTES). **Itapúa:** Capitán Miranda, 4.2 km N of entrance to Hotel Tirol, behind CONAVI project (27°12'S, 55°45'W), 9 Nov 1995



FIG. 7. *Psidium missionum*. A. Montes 14781 (NY), flower buds and portions of leaves. B. Krapovickas & Cristóbal 44607 (ASU), twigs, leaves, and flowers after anthesis. Typical plants are subglabrous and have triangular calyx-lobes.

(fl), *Landrum* 8808 (ASU, FCQ); Capitan Miranda, road to Jesús ca. 0.6 km from main highway (ca. 27°12'S, 55°45'W), 9 Nov 1995 (fl), *Landrum* 8812 (ASU, FCQ); **Paraguarí:** road to Lago Ypoa, ca. 23 km N of Caapucú, 35 km W of main Asunción-Encarnación highway, ca. 250 m, 10 Nov 1995 (fl), *Landrum* 8838 (ASU, FCQ).

Psidium missionum frequently grows with *Psidium salutare* var. *mucronatum* (Cambess.) *Landrum* [=*Psidium luridum* (Spreng.) Burret] and can be confused with that entity. The two are contrasted in the key below.

1. Leaves 2–4.5 cm long, 0.7–2.3 cm wide, 1.5–5 times as long as wide; marginal vein distinct, closely following the margin; placenta protruding, peltate; style 5–6 mm long, glabrous _____ **P. salutare** var. **mucronatum**
1. Leaves 2.5–8.8 cm long, 1.1–4 cm wide, 1.8–3.5 times as long as wide; marginal vein evident only in distal portion of leaf, arching broadly between laterals; placenta protruding only slightly, not peltate; style 7–9 mm long, usually with a few scattered hairs _____ **P. missionum**

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